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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/075,643	02/13/2002	Young-Beom Jang	8045-36 (PX1344-US/SSD)	9381
22150	7590	02/14/2006	EXAMINER	
F. CHAU & ASSOCIATES, LLC 130 WOODBURY ROAD WOODBURY, NY 11797			DO, CHAT C	
			ART UNIT	PAPER NUMBER
			2193	

DATE MAILED: 02/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/075,643

Applicant(s)

JANG, YOUNG-BEOM

Examiner

Chat C. Do

Art Unit

2193

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 18 August 2005 and 18 November 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1, 5-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 5-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

### DETAILED ACTION

1. This communication is responsive to Amendment filed 08/18/2005.
2. Claims 1 and 5-21 are pending in this application. Claims 1, 7, 10-11, 14, and 17-21 are independent claims. In Amendment, claims 2-4 are cancelled. This Office Action is made non-final 11/18/2005.

#### *Claim Rejections - 35 USC § 102*

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1 and 5-21 are rejected under 35 U.S.C. 102(b) as being anticipated by Pasko et al. (“Optimization Method for Broadband Modem FIR Filter Design using Common Sub-expression Elimination”).

Re claim 1, Pasko et al. disclose in Figures 1-3 a filter coefficient design method (abstract) in a digital filter (FIR filter in abstract lines 1-5 page 100) having a plurality of filter coefficients that are expressed with CSD code words of n bits (n: natural number more than 2) (e.g. page 100 right column lines 9-16), comprising the step of: making code word sub-expression for random filter coefficients out of the filter coefficients as a virtual common sub-expression that is relevant to a predetermined common sub-

expression so that a plurality of adders are shared with the predetermined common sub-expression in tap lines of the random filter coefficients (e.g. Figure 2 and left column page 101 under method overview section), wherein the virtual common subexpression has a single bit shifted, added or inverted relative to the predetermined common subexpression (e.g. Figure 1 wherein the code word sub-expression is part b, the predetermined common subexpression is shifted and added part in b, and the virtual common subexpression is the CSE of CSD as seen in c comprising at least a predetermined common subexpression).

Re claim 5, Pasko et al. further disclose in Figures 1-3 the virtual common sub-expression becomes identical to the common sub-expression through at least two more processes out of bit-shift, bit-add and bit-inversion (e.g. Figure 3 contains all the shift, add, subtract/inversion).

Re claim 6, Pasko et al. further disclose in Figures 1-3 the digital filter is a linear phase FIR filter (e.g. Figure 3a).

Re claim 7, Pasko et al. disclose in Figures 2-3 a method for receiving and filtering input signals of digital samples of k bits (k: natural numbers more than 4) in a digital filter having filter characteristics that are created by filter coefficients being expressed as CSD code words of n bits (n: natural numbers more than 2), comprising the steps: creating as a virtual common sub-expression (e.g. CSD coefficients set-optimized in Figure 2) common sub-expressions created by bit-shift, bit-add, or bit-inversion (e.g. these operations are seen in Figure 3c) of random coefficient sub-expressions (e.g. Figure 3a wherein h0-h2 are coefficients of the FIR filter) out of the digital filter coefficients,

thereafter shifting the digital samples by the number of bits corresponding to the common sub-expression and the virtual common sub-expression, adding (e.g. all the addition boxes in Figure 3c) up all the digital samples shifted by the number of bits corresponding to the common sub-expressions to obtain a composite output value of a common coefficient tap line; obtaining composite output values of random coefficient tap lines by adding up (e.g.  $y_0$ - $y_2$ ) the digital samples shifted by the number of bits corresponding to the virtual common sub-expression and the composite output value of the common coefficient tap line being used as a common input; and performing in order delaying (e.g. Figure 3a wherein  $z^{-1}$  is the delay for proper FIR filter) and adding to create filter output values by subsequent compositions of the composite output values of the common coefficient tap Lines and the composite output values of the random coefficient tap lines.

Re claim 8, Pasko et al. further disclose in Figures 2-3 the number of the tap Lines is set as 73 in case where the digital filter is used in a middle frequency terminal of a mobile radio communication system (e.g. page 101 last line of left column and first line of the right column).

Re claim 9, Pasko et al. further disclose in Figures 2-3 the number of bits of the CDS code word is 24 bits (e.g. page 101 last line of left column and first line of the right column).

Re claim 10, Pasko et al. disclose in Figures 2-a digital filter, comprising: a shift register group (e.g.  $\gg 3$  and  $\gg 2$  in Figure 3c) including first shift register members each receiving digital samples of  $k$  bits as input signals and shifting the received digital samples by bit shift values of filter coefficients that are defined as common sub-

expressions out of filter coefficients that are expressed as code words of  $n$  bits within CSD code, and second shift register members shifting code words of the other filter coefficients that are not defined as the common sub-expressions by using the code words of the common sub-expressions, a adder group (e.g. all addition boxes in Figure 3c) including first composite members adding up the shifted digital samples that are output from the first shift register members to provide them to common tap Lines, and second composite members for adding the shifted digital samples that are output from the second shift register members to the composite outputs of the common tap Lines to provide the results to each of corresponding tap Lines; a delay group (e.g. all  $z^{-1}$  in Figure 3a) including a plurality of delayers connected to the tap Lines and being connected in series from one another to provide delay to the composite outputs; and an output adder (e.g. last adder in Figure 3a) group including a plurality of adders for adding up the outputs of the delayers and the composite outputs of the tap Lines to create digital output signals of  $k$  bit(s).

Re claim 11, it has same limitations cited in claim 10. Thus, claim 11 is also rejected under the same rationale as cited in the rejection of rejected claim 10.

Re claim 12, Pasko et al. further disclose in Figures 2-3 the common tap Line is a tap Line of filter coefficients having the greatest number of common coefficient sub-expressions out of the filter coefficients (e.g. page 102 right column lines 1-10).

Re claim 13, Pasko et al. further disclose in Figures 2-3 the digital filter is designed with software by a digital signal processor performing shifting, adding, and delaying (e.g. page 100 left column first paragraph under the introduction section and all

the section under page 102 right column including pattern identification, pattern selection, and searching algorithm).

Re claim 14, it is a method claim of claim 1. Thus, claim 14 is also rejected under the same rationale as cited in the rejection of rejected claim 1.

Re claim 15, Pasko et al. further disclose in Figures 2-3 at least the second sub-expression is formed from the virtual common sub-expression through at least one of a bit-shift, a bit-add and a bit-inversion (e.g. Figure 3b).

Re claim 16, it is a method claim of claim 5. Thus, claim 16 is also rejected under the same rationale as cited in the rejection of rejected claim 5.

Re claim 17, it is a program storage device claim of claim 1. Thus, claim 17 is also rejected under the same rationale as cited in the rejection of rejected claim 1.

Re claim 18, it is a system claim of claim 1. Thus, claim 18 is also rejected under the same rationale as cited in the rejection of rejected claim 1.

Re claim 19, Pasko et al. disclose in Figures 2-3 at least one shift register (e.g.  $\gg 3$  and  $\gg 2$  in Figure 3c) for receiving digital samples of input signals and shifting the received digital samples by bit-shift values of filter coefficients that are defined relative to a virtual common sub-expression; a first adder (e.g. first adder that add  $x$  and  $-x \gg 3$  in Figure 3c) for adding shifted digital samples that are output from the at least one shift register to drive a common tap Line; a second adder (e.g. adder for yielding  $y_1$  in Figure 3c) for adding shifted digital samples that are output from the at Least one shift register to the output of the common tap line to drive a tap line corresponding to a filter coefficient;

and at Least one delay unit (e.g.  $z^{-1}$  in Figure 3a) connected to a tap Line for delaying an output signal component.

Re claim 20, it has same limitations cited claim 19. Thus, claim 20 is also rejected under the same rationale as cited in the rejection of rejected claim 19.

Re claim 21, it is a program storage device claim of claim 20. Thus, claim 21 is also rejected under the same rationale as cited in the rejection of rejected claim 20.

### ***Response to Arguments***

5. Applicant's arguments filed 08/18/2005 have been fully considered but they are not persuasive.

a. The applicant argues in pages 11-12 for independent claims that the cited reference by Pasko '97 fails to disclose a virtual common subexpression as a subexpression that was not originally common to any filter coefficients but was instead "designed and changed ... by using an existing... subexpression" "bit-shifted, bit-added, or bit-inverted...into an artificial...(or) virtual common subexpression as defined in the specification.

The examiner respectfully submits that the definition of virtual common subexpression as above is not cited in the claim. Even if it is defined in the claim the virtual common subexpression as above, the cited reference clearly discloses the virtual common subexpression as the final expression after CSE wherein the original expression is CSD and the predetermined expression is single shifted and



added expression. Figure 3 part c discloses the virtual common expression wherein it comprises an shifter and adder with negated.

### ***Conclusion***

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

b. U.S. Patent No. 5,886,914 to Sugawa et al. disclose a filter circuit with reduced number of delay elements and adders.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chat C. Do whose telephone number is (571) 272-3721. The examiner can normally be reached on M => F from 7:00 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chaki Kakali can be reached on (571) 272-3719. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

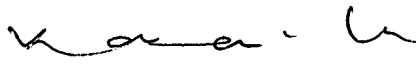
Chat C. Do

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Examiner  
Art Unit 2193

  
**KAKALI CHAKI**  
**SUPERVISORY PATENT EXAMINER**  
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